

**Title:** Developing a family resilience assessment tool for health visiting/public health nursing practice using virtual commissioning, high-fidelity simulation and focus groups.

**Short Title:** Family resilience assessment & PHN/HV

Corresponding author: David Pontin PhD, Aneurin Bevan Chair of Community Health, Faculty of Life Sciences & Education, University of South Wales, UK CF37 1DL 01443 483059  
[david.pontin@southwales.ac.uk](mailto:david.pontin@southwales.ac.uk)

## Authors

David Pontin, Aneurin Bevan Chair of Community Health, Faculty of Life Sciences & Education, University of South Wales, UK

Michelle Thomas, Senior Lecturer – Specialist Community Public Health Nursing [Health Visiting], Faculty of Life Sciences & Education, University of South Wales, UK

Georgina Jones, Flying Start Health Visiting Deputy Manager, Abertawe Bro Morgannwg University Health Board, Wales, UK

Jane O’Kane, Head of Nursing, Children Young People & CAMHS, Cwm Taf University Health Board, Wales, UK

Liz Wilson, Flying Start Health and Social Care Manager, Hywel Dda University Health Board, Wales, UK

Fran Dale, Independent Health Visitor, Wales, UK

Dean Whitcombe, Simulation Suite Operator, Faculty of Life Science & Education, University of South Wales, UK

Carolyn Wallace, Associate Professor in Integrated Care, Faculty of Life Sciences & Education, University of South Wales, UK

## Abstract

### ***Introduction***

UK public health nurse assessment of family resilience is a necessary component of monitoring family health and children’s development, and identifying areas for change. This research was part of an exploration of Welsh public health nurses’ understanding of ‘family resilience’ as a concept underpinning their practice. From it, the Family Resilience Assessment Instrument Tool (FRAIT™ [www.frait.wales/](http://www.frait.wales/)) was developed for public health nurses use. We report on a virtual commissioning process using focus groups and an

immersive simulation suite to test a FRAIT prototype in a safe environment before field-testing.

### ***Methods***

Virtual commissioning design: Hydra-Minerva Immersive Simulation Suite - individual public health nurses presented with a multi-media scenario as they used the prototype FRAIT. Follow-up focus groups for usability insights before field-testing.

### ***Findings***

Virtual commissioning raised real world issues which public health nurses discussed in focus groups. Issues were - scoring, absence of information, focusing on family resilience, identifying adults caring for children, potential for use, identifying need and monitoring change, potential impact of using FRAIT, and fitting it to everyday practice.

### ***Conclusion***

Prototype testing like this allowed us to fine tune the FRAIT for field-testing.

**Keywords:** Family Resilience Assessment; Public Health Nursing/Health Visiting; Virtual Commissioning; High Fidelity Simulation Training; Focus Groups

## **Introduction**

UK health visitor/public health nurse (PHN) assessment of family resilience has become a necessary component of monitoring family health and children's developmental outcomes, and identifying areas for intervention. The research reported here was part of an in-depth exploration of Welsh PHNs' understanding of family resilience as a concept underpinning their practice. This led to the development of the Family Resilience Assessment Instrument Tool (FRAIT™ [www.frait.wales/](http://www.frait.wales/)) and training package for use by PHNs in every-day practice. Welsh Government has incorporated FRAIT™ into the universal provision of PHN services in Wales as described in the Healthy Child Wales Programme (WG, 2016). This aim of this paper is to present the results of the second stage of the FRAIT™ study i.e. to evaluate FRAIT™ through simulation using a virtual commissioning design from engineering (Auinger et al., 1999; Hofmann et al., 2017; Hoffman et al., 2010; Liu et al., 2012). A high-fidelity immersive simulation suite (Hydra-Minerva) and focus groups were used to road test a FRAIT™ prototype in a safe, controlled environment before field-testing (see author, 2018 for a report on stage 1 – family resilience concept development and testing). We believe there is scope for using virtual commissioning when investigating PHN settings during translational research such as this (Weeks et al., 2013). We have been unable to identify similar initiatives to develop evidence-based family resilience assessment processes using virtual commissioning in the international literature.

## ***UK public health nursing - health visiting***

'Health visiting' is the commonly used term used to describe the UK specialist community public health nursing service for all children under 5 years. Health visitors (specialist community public health nurses) work with individuals, families, groups and communities along with other health professionals, and social work and education colleagues to enhance health and reduce health inequalities (WG, 2012). This is achieved via a proactive universal service, and a targeted service for vulnerable populations according to need. Health visitors are regulated by the UK Nursing Midwifery Council (IHV, 2017; NICE, 2014; NMC, 2016). UK health policy is devolved to the four constituent country governments (England, Wales, Scotland and Northern Ireland) who are responsible for service delivery and policy context (DHSS&PS, 2010; NHS England, 2014; Scottish Government, 2015; WG, 2016). While we

specifically address the Welsh context here, we anticipate that issues are transferable for PHN practice in other countries.

UK PHN practice follows 4 principles: searching for health needs; stimulating an awareness of health needs; influencing policies affecting health; and facilitating health-enhancing activities (Cowley and Frost, 2006). It is a social action process where professionals support parents in their social context and work with them to identify supportive interventions (Malone, 2000). The professional relationship between families and PHNs is grounded in information giving, evidence-based guidance and supported decision-making on family management issues. It promotes family learning to reduce health and social inequalities, provides safeguards for children against identified risks, and aims to develop resilient families (DWP/DfE, 2011). PHN professional judgement is supported by using instruments/tools to assess family environments, and identify the need for specific interventions to address any family resilience issues (WG, 2016).

### ***Healthy Child Wales Programme***

Welsh Government launched the Healthy Child Wales Programme (HCWP) in 2016. HCWP is an integrated universal service with targeted interventions for families and children in greatest need. A stated aim is for PHNs to use a common assessment tool to help families access the right support at the right time. The three key universal interventions of HCWP are: screening, immunisation, and surveillance (i.e. monitoring and supporting child development). Promoting family resilience is central to the HCWP agenda. Following its 2016 introduction, Welsh Government announced that a family resilience assessment tool and acuity instrument would be introduced in 2017 to support PHN professional judgment and decision making.

Wales is not alone in having families who face health challenges due to poverty and unemployment. Some families face challenges due to adult members having experienced adverse childhood experiences such as abuse, violence, exposure to significant adults experiencing mental health problems and/or drugs and alcohol misuse, and incarceration (Ashton et al., 2014). Wales has the worst rates of childhood obesity and smoking during pregnancy in the UK, hence the call for PHNs to use evidence-based measures to identify need and use appropriate evidence-based interventions (RCP&CH, 2016).

### ***Family resilience***

Family resilience is *'the ability of a family to respond positively to an adverse situation and emerge from the situation feeling strengthened, more resourceful and more confident than its prior state.'* (Simon et al., 2005: 427). The family is seen as a unit, and resilience refers to the family itself rather than the individual members. Usual family life includes episodes of change, crises, conflict, and expected and unexpected challenges (Walsh, 2006). Some crises or stressors are developmental and part of usual expected family transitions, others are situational and unexpected (Sixbey, 2005; Walsh, 2006). Family resilience is shaped by three key components - family crisis duration, the point in the family life course when the crisis emerges, and external family relationships type and strength (Simon et al., 2017).

There are three strands to the family resilience literature characterised as family stress; family system protective factors; and family as an adaptive system (Henry et al., 2015). The first strand led by family therapists uses family stress theory as an organising principle (McCubbin and Patterson, 1981; Werner and Smith, 1982). The second strand defines family resilience in relation to family system protective factors (e.g. housing) and processes at individual, family and community level (Black and Lobo, 2008; Patterson, 2002; Walsh, 2002). McCubbin and McCubbin (1996) describe successful family system adaptation as 'bounce back' from stressful situations, with some experiencing family growth. Patterson developed the Family Adjustment and Adaptation Response model that proposes three forms of family adaptation when faced with crisis - reduce demands; learn new coping mechanisms; and reinterpret what is most important to the family (Patterson, 2002). Walsh developed a conceptual model built around 'family beliefs systems', 'organisational patterns' and 'communication processes' (Walsh, 2002), which was used by Sixbey (2005) for the Family Resilience Assessment Scale. This has six subscales - family communication and problem solving, using social and economic resources, maintaining a positive outlook, family connectedness, family spirituality, and ability to make meaning of adversity.

The third strand views families as adaptive systems, and family resilience as a multidisciplinary framework. Because it is an adaptive system, a family may change when faced with crisis by using multi-level protective factors available in its sub-systems and

interconnected ecosystems (Henry et al., 2015) e.g. using social networks and healthcare services appears to strengthen family resilience in a time of crisis (Walsh, 2002). Henry et al. (2015) developed the Family Resilience Model (FRM) and the Family Adaptive System (FAS) based on a structure of family relationship patterns and functions that the family fulfils e.g. health, education and socioeconomic and behavioural patterns (rules and social expectations) that vary from family to family.

The family resilience literature has been developed by family therapists, Certified Family Life Educators and others from a mental health background (DWP/DfE, 2011; Henry et al., 2015). This shapes the notion of family resilience, and the application of models for practice (Rogers and Knafl, 2000), and has implications for choosing the right tool/scale for PHNs to use across Wales. In [authors] et al (2018) we describe the first stage of the FRAIT™ study where we worked in partnership with PHNs to make extant their construction of family resilience, and developed a family resilience assessment instrument and tool to support their practice and meet Welsh Government requirements (WG 2016). This aim of this paper is to present the results of the second stage of the FRAIT™ study i.e. to evaluate FRAIT™ through simulation before using it in clinical practice. We used a virtual commissioning process (Auinger et al., 1999; Hofmann et al., 2017; Hoffman et al., 2010; Liu et al., 2012) using an immersive high-fidelity simulation suite (Hydra-Minerva) and focus groups to road test a FRAIT™ prototype in a safe, controlled environment before field testing.

## **Methods**

A virtual commissioning design was used to generate data using immersive high-fidelity simulation (Auinger et al., 1999; Hofmann et al., 2017; Hoffman et al., 2010; Liu et al., 2012) and focus groups (Stewart and Shamdasani, 2014). Virtual commissioning is a process used in manufacturing to test systems and control programs through simulation before using them in real-world settings (Liu et al., 2012). The aim is to reduce the time taken to introduce a production process into a physical environment and identify and fix some of the implementation issues early on (Hoffman et al., 2010) in the translational research process (Weeks et al., 2013). Virtual commissioning is not a replacement for the physical commissioning of a process, as not all real-world implementation issues will be apparent in a virtual environment. The benefits of using virtual commissioning are:

- discovering design and planning errors before building the physical system
- shortening the physical commissioning time period
- being independent from the physical system's location
- being independent from the physical system's installation time
- faster execution of test programs and an increased number of test scenarios
- testing improvements during operation of the extant physical system
- simplified control development through direct feedback from the virtual system

(Hofman et al., 2017: 25).

Simulation modelling is an integral part of virtual commissioning and stands in for the real-world process (Auinger et al., 1999). We designed a virtual commissioning process using simulation modelling with scenarios supported by multi-media information sources to test the early version of the FRAIT™ in a safe environment. We created a standardised environment to test the tool and instrument using the University's Hydra-Minerva immersive simulation suite (Hydra Foundation, 2017). This allowed us to control the presentation of information to PHNs, which included a specially produced series of video scenarios using actors depicting PHN initial visits to a new mother and baby. Twenty eight PHN volunteers were recruited from the stage 1 concept development study (author et al., 2018) and were trained to use the FRAIT™. They were asked to use the FRAIT™ to make an assessment of family resilience, and identify areas for support and/or intervention when engaging with the scenarios.

The simulated assessments made by PHNs were supported by the assessment tool and instrument, guidance documentation on their use, a written case study narrative with additional documentary information, and video and audio clips of typical practice scenarios i.e. initial visits to a new mother (see [www.frait.wales/](http://www.frait.wales/)). After the simulation exercise, five focus groups were held to capture PHNs' experience of using the instrument and tool for assessment. Group size was no larger than six per focus group, and facilitated by CW, while GJ acted as observer (Stewart and Shamdasani, 2014). Other team members observed the focus groups through the Hydra-Minerva live video streaming and made notes. Anonymised focus group interviews and observer notes were analysed using thematic analysis, and etic

theme headings were generated (Silverman, 2013). Following focus group data analysis, the instrument and tool were refined to maximise FRAIT™ usability.

Ethical approval for the study was given by the University of South Wales Faculty Research Ethics Committee. Participants received information leaflets before written consent was sought from them to take part, and were assured of anonymity in research reports.

## **Findings**

**Scoring:** PHNs were asked to indicate their level of concern about a family's resilience on the FRAIT™ using a Likert scale e.g. low concern scoring 5 suggesting high resilience. They found the idea of using a 'high' score to indicate 'low' concern counter-intuitive. PHNs expressed concern that using such a system in practice would be confusing and lead to errors. Following feedback the assessment tool scoring element was changed so level of concern ranged from Low-High rather than using a number to indicate magnitude.

Focus group 3:

HV 5: I think from scoring I had to stop now and again, just remind myself because it's back to what we said earlier on. It's a reverse of scoring isn't it? At one point I thought I'd done it completely wrong. I had to stop and just re-check that I had scored them where I thought I had.

We observed PHNs moving back and forth through the paper assessment tool when reviewing scenario data – building their understanding of the situation and checking veracity. This has implications for developing e-versions of FRAIT™ i.e. not to restrict PHNs to a linear progressive model of completion as it is likely to interfere with their checking behaviour and make completion more onerous.

## ***Absence of Information:***

PHNs sought clarification on how to address an assessment tool item if information had not been gathered through the simulation exercise, or if a particular situation had not happened. They also made suggestions about item format and changes for greater utility.

Focus group 2:

HV 3: The only thing I was unsure about, the tool that we use now, we didn't score them low if the factor doesn't exist. So I was wondering how



that would work here, because I've noted a couple of boxes that I didn't score because I didn't have that information - noticeably 30, 31, 28 & 39. There might have been one or two others, either cos they didn't apply or because I didn't have the information. I was just wondering then how that would affect the score? Whether it would skew the effect of how resilient that family were?

***Focusing on Family Resilience:***

For some PHNs, details in the assessment document distracted them from resilience assessment and prompted long discussions on aspects of practice, in particular reviewing child development. They were aware of imminent practice changes due to HCWP implementation and tried to fit what they anticipated was coming to the assessment tool. This gave us insight into its usability, without virtual commissioning this would only be available on physical commissioning with the attendant problems of making nation-wide changes to PHN practice not long after FRAIT™'s implementation.

Focus group 2:

HV 3: and I think we need to keep focussed. This is measuring family resilience not child development but of course we know that one impacts on the other. But I think that if we had something in broader, encompassing (items) 30 and 31 – 'Emotional Development' I suppose should stand alone, shouldn't it? And also behavioural development I think should stand alone, but I think (items) 30 and 31 could be lumped together and just say the child is meeting developmental milestones. That's not worded very well but however you wanted to word it.

***Identifying adults caring for children:***

PHNs drew on their practice experience in the discussions of how the assessment tool should indicate which adults care for children in a same-sex family grouping, and the language used to identify parents/carers who are the main carer, and those who have a supporting role.

Focus group 2:

HV 4: The other thing to throw in the mix. We've had, in (locality) recently, we've had quite a lot of same sex relationships so I don't know whether we could re-word the father's part?

CW: ... What do you use in practice? What would you use?

HV 3: Parent or carer.

HV 2: I use two mothers.

HV 1: You haven't got that on FAT have you? It's not specific.

HV 3: No but it does say parent or carer. Whether that's specific enough I don't know.

### ***Potential for Use:***

PHNs considered the assessment tool to be comprehensive and potentially useful in practice. They highlighted helpful aspects that had not been present in previous assessment documents, and their possible use in multi-disciplinary/inter-professional working scenarios. They also noted its utility when mentoring/supporting newly qualified PHNs, and students.

Focus group 5:

HV 1: It's a good tool to generate discussion isn't it. So it is highlighting the fact that you want to talk about things that we wouldn't have talked about before, like dad's relationship with his parents which has a huge impact on family resilience. That's not something that we would automatically ask if dad's not there so it's really good for generating that conversation and getting a more holistic view of the family. I like it for that reason (agreement).

Focus group 3:

HV 3: I was thinking how good a tool it would be during that mentoring period with newly qualified staff when perhaps they're going out and doing, managing their caseload and they're supporting families and use it as part of a reflective process during that preceptorship because you can discuss....

So it's about professional judgement and accountability. But it's, I certainly think it will be really valuable with newly qualifieds, students, and I think it makes us experienced HVs look more broadly at the situation. Health visiting for some people is still very medicalised. It gives us a framework to share with partner

agencies when you have, when you've made those robust assessments and you then need to make a referral. I don't think that we've got anything that we can say to social care, 'We've done those assessments and here is what we've used'. They then spend 3 months doing what we've been doing for 3 months. We need to have something.

***Identifying need and monitoring change:***

Welsh Government has adopted an intensive family support intervention service (Flying Start) for deprived areas based on the US Head Start initiative (WG 2017). This means there are two variants of health visiting practice in Wales - Flying Start, and generic. Flying Start PHNs have smaller caseloads (n=114) and access to a wide range of social and education resources to support families. Generic services equate to a traditional universal health visiting service with larger caseloads (n= 300-400plus) and no additional resources. PHNs saw the assessment tool as a means to identify need, make interventions and monitor changes as in their view it focuses on the right areas for their practice, and identifying a family's ability to change is useful.

Focus group 4:

HV 1: but no, very useful tool, definitely, even for generic HVs, because it's a way of quantifying meaning: are things changing, are they improving, are they getting worse? That then helps you to identify that need.....

HV 2: ... I think the only difference would be about looking at the family's ability to change and recognising those changed circumstances. Which actually came out quite well in the video I think. You could see that she had been, had that discussion with a health visitor about the smoking and the drinking and the next visit. Those had been addressed, so you can see that actually that's been picked up. So you're able to glean that information from the assessment. So I, no I think it sort of fits quite well and I don't think that there's anything major that I thought, 'Oh no, I don't understand the way that was worded'.

***Potential impact of using FRAIT™:***

PHNs discussed the impact of using FRAIT™ to determine individual families' level of need and resource availability. They anticipate differences between generic services and Flying Start, that it will be useful for inter-agency referral about child and family needs, and the score providing evidence to meet child protection criteria.

Focus group 4:

HV 2: Because I think we all know in our heads where it would sit. That's subjective, ok these have got a really low score therefore need extra interventions and support, but if we're going to be looking at a tool that is universal and that everybody's actually pointing to the same objectives being met, then you need to say, 'Well actually if you've got a score of this, then you should be looking at trying to get these services involved', and that may also then impact on what services are out there, because with Flying Start that's not a problem! We can send them all to the services and get all those other people involved but in other areas you're not going to get that, but if you've got a low score they need those services, so it will be able to impact on those as well.

HV 1: See we were also saying earlier that it's a good tool to use say if you were doing a referral to children's services; just a child in need. It's a way of identifying, quantifying, and being very clear what the needs of that family are as well. So that would be your evidence; which I think would be really helpful (agreement), in the area where we work because again they are always upping the ante on child in need/child protection criteria, and I think that would work very well.

HV 2: Impact on service provision as well. Because if you've got an area that's saying, 'Actually we've got a lot of low resilient families but we've got nowhere to point them to', that highlights a need for that area doesn't it. Which is what we were saying earlier about Flying Start and generic; being needs based perhaps, this would enable us to be able to, perhaps go needs based rather than post-code: that's a whole different ball game (laughter).

***Fitting everyday practice:***

Using FRAIT™ in the simulation suite allowed PHNs to judge its fit with everyday practice in a safe environment. They acknowledged the need to make assessing family resilience relevant to generic PHNs otherwise it may be seen as a bureaucratic exercise. They anticipated populating FRAIT™ from pre-existing routinely collected data e.g. antenatal contacts, and using the instrument as an aide memoire for the assessment tool.

Focus group 4:

HV 2: No, I think if you're looking at possible negatives, I think timing would be an issue. You know, certainly within Flying Start it wouldn't be an issue. But I know the girls that work with us that are on the generic side, they would automatically see it as another four pieces of paper they have to fill in; and when are they going to get the time to do that? So I think if you're trying to, I don't know the way round it but, because I think it needs to be comprehensive that needs to be a, that assessment needs to be done but I think they would perhaps say, 'Oh you know it's another piece of paper that adds to', especially when you've got a caseload of 350-370.

HV 3: A lot of it you do anyway. You get a lot of information especially if you've had an antenatal form; you get an awful lot of information from that. And if you get, and if you've known the family; if you've been working the area; if you know the family for a while - you've got information from that so it, it all feeds in, doesn't it? I do think on a birth visit.

## Discussion

FRAIT™ was identified by Welsh Government as a central element of the Healthy Child Wales Programme (HCWP). In developing FRAIT™ it was apparent that virtual commissioning has limitations as it could not be a replacement for physical commissioning as not all of the real-world implementation issues can be made apparent in the Hydra-Minerva immersion simulation suite. Even though virtual commissioning allows researchers to simulate aspects of the real world, there is still the need to field-test FRAIT™ in usual PHN practice conditions to ensure its fitness for purpose and maintain safety. However, despite these obvious limitations, using the high-fidelity simulation environment allowed us

to make changes to FRAIT™ in a safe environment without jeopardising family safety. We were unable to follow a standard model of virtual commissioning because FRAIT™ was not part of PHN practice at that time and consequently the benefits identified by Hofman et al (2017: 25), ‘testing improvements during operation of the extant physical system’ were not witnessed. Despite this limitation, the remaining benefits of using virtual commissioning were apparent i.e.

- discovering design and planning errors before building the physical system
- shortening the physical commissioning time period
- being independent from the physical system’s location
- being independent from the physical system’s installation time
- faster execution of test programs and an increased number of test scenarios
- simplified control development through direct feedback from the virtual system.

Using virtual commissioning in this way helped us move swiftly through this part of the translation research process (Weeks et al., 2013) so the research could be field-tested and subsequently be incorporated into everyday use. This was particularly important given the time-pressures of working with national policy initiatives. Using the Hydra-Minerva high-fidelity simulation environment and the focus groups allowed us to identify the potential use of FRAIT™ in PHN practice in Wales - how PHNs with Flying Start caseloads might use it as opposed to those carrying generic caseloads, and the possible implications for Welsh Government policy on future PHN commissioning. In particular, how PHNs anticipate using FRAIT™ to mentor students, and coach new staff. We anticipate exploring these issues in due course once sufficient data is available.

Family resilience as used in FRAIT™ offers an original contribution to the international literature on PHN practice. It draws on the theoretical and practice background of PHNs where the focus is on the resilience of families as a single unit due to the social interdependence of individual family members within the family unit (Johnson and Johnson 1989, 2009). FRAIT™ considers family strengths, resources and concerns as a means to support productive positive behaviour, and in doing so operationalises the four principles of UK PHN practice: searching for health needs; stimulating of an awareness of health needs; influencing policies affecting health; and facilitating health-enhancing activities (Cowley and

Frost 2006). This is a re-conceptualisation of PHN practice in Wales and further work is required to identify the practice issues that such a change makes to working with families.

## Conclusion.

Developing relevant practice evidence for use by practitioners is challenging (Thompson et al., 2005). There is scope for using virtual commissioning when carrying out translational research such as this (Weeks et al., 2013) to overcome some of these challenges of physical commissioning. We have not found similar initiatives to develop evidence-based family resilience assessment processes using virtual commissioning when searching the international literature, and we hope this paper encourages other PHNs to consider using this way of working.

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